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WORK OF

THE UNITED STATES DEPARTMENT OF AGRICULTURE

FOR THE YEARS 1889, '90, '91.

The United States Department of Agriculture.

The following pages contain a summary of the more important features which have characterized the administration of the U. S. Department of Agriculture since Secretary Rusk accepted from President Harrison the portfolio which was practically that of the first Secretary of Agriculture. It is a plain statement of facts, every one of them of record, enumerating succinctly those acts by which it is believed the efficiency and scope of the Department work has been increased and its utility to the agricultural interests of the country enhanced.

THE ANIMAL INDUSTRY.

When Secretary Rusk began his administration of the Department of Agriculture he found a number of conditions existing which had a very depressing effect upon the animal industry of the country. These were:

1. The prevalence of the contagious pleuro-pneumonia of cattle in the States of New York, New Jersey, and Maryland, which had led to burdensome local restrictions imposed upon the transportation of cattle in the United States, and to prohibitions abroad which required our cattle to be slaughtered on the docks where landed, within a limited period after arrival or to be held in quarantine for so long a period as to cause disastrous losses to exporters.

2. The yearly infection of our stock-yards and stock-cars with the disease known as Texas fever, which caused heavy losses among cattle purchased for grazing purposes and among those exported.

3. The repeated reports of contagious disease among our exported cattle which were promulgated by English inspectors to the demoralization of our trade and the depression of prices, and which threatened to lead to the entire destruction of this important trade.

4. The crowding of cattle upon improperly fitted ships which was followed by losses from suffocation and other causes, and furnished another argument used by the enemies of the live cattle trade to secure its entire prohibition.

5. The prohibition of the introduction of American pork enforced by nearly all the countries of Continental Europe.

To remove these obstacles to the prosperity of our farmers, it was necessary to inaugurate and enforce a comprehensive system of regulations for the inspection and protection of our animals and meats. While the end in view was by all considered most desirable, many stockmen and meat packers considered the required measures to secure it, to be impractical and impossible of execution.

MEASURES IN CONNECTION WITH PLEURO-PNEUMONIA.

The first efforts were given to hastening the work for the eradication of pleuro-pneumonia, and these were so successful that Maryland has been free from it for two and a half years, and New York for more than a year. It is also nearly or quite eradicated from New Jersey as no cases have been reported by the inspectors there since March, 1892.

Considering how little of the disease was to be found in the United States,

that the infected districts were strictly quarantined, and that our export cattle came from uninfected sections of the country, it was not considered possible that so many cattle could be diseased on their arrival in England as were being constantly reported by the British inspectors. To obtain proper evidence in regard to this, three veterinary inspectors were sent from the Department to examine our cattle when landed and slaughtered on the docks of Great Britain. All export cattle were numbered by means of a brass tag fastened to the ear when they reached the first stock-yards for sale. From this number, any animal suspected of infection when it reached its destination, could be identified and its history traced by the records of the Department to the farm where it was fed. This provided an easy way of settling any disputes which might arise between the American and English inspectors. All cattle were also inspected by veterinarians before leaving our ports to guaranty their freedom from disease at that time.

The result of this has been that, during the two years our inspectors have been in England, but three cases of pleuro-pneumonia have been alleged against our cattle, and the history of these particular animals showed that they came from a section of the country where the disease had never been and that they could not possibly have been infected on the way. The reputation of our cattle has therefore been established. While no modification of the regulations has been secured from Great Britain, Hamburg has conceded the privilege that our cattle may now be slaughtered immediately on arrival, instead of being held four weeks in quarantine as was previously required, and Belgium has reduced the period of quarantine from forty-five to five days. In each of these cases regulations which prohibited trade have been changed and made favorable to it.

Some idea of the amount of work required to accomplish this may be gathered from the statement that during the year ending June 30, 1891, there were tagged and registered by the inspectors 362,402 head of cattle that went into the export trade.

REGULATIONS REGARDING TEXAS FEVER.

To prevent the ravages of Splenic or Texas fever among our home cattle as well as among those on their way to foreign markets, and to remove the bad influence which the existence of such a disease has upon purchasers of animals and meats, regulations were adopted for preventing the dissemination of this infection. The district from which cattle come that are capable of disseminating the infection was carefully outlined, all stock-yard companies were required to set apart special pens for such cattle, and railroad companies were required to have the cars in which they were transported properly cleaned and disinfected. Such dangerous cattle can only be shipped north for immediate slaughter during the winter months when they do not cause disease.

These simple regulations have done away with the more burdensome ones previously enforced by the several States. They have really facilitated the movement of the cattle which they apply to, and they have almost entirely prevented the disease. Cattle can now be purchased in our stock-yards with safety, and the danger from this disease is no longer thought of, whereas before the adoption of these regulations the losses were very heavy. The saving which has resulted cannot be accurately stated, but an idea can be obtained from the reduction of insurance charges on export cattle. Before the regulations were adopted the insurance rates were eight and ten per cent. of the value of the animals, now they are less than two per cent, a saving of five dollars per head on each animal exported, or about two million dollars a year.

HUMANE TREATMENT OF CATTLE ON SHIPBOARD.

To ensure proper accommodations and humane treatment of export cattle, the act of March 2, 1892, was passed by Congress on the recommendation of the Secre-

tary of Agriculture. Under this act stringent regulations are enforced providing for the erection on board ship of strong and suitable fittings, with sufficient space and adequate ventilation. They also provide for competent men to care for the animals. These regulations guard against suffocation between decks or washing overboard of fittings and animals, and they ensure our animals reaching foreign markets in the best possible condition. They also do away with the objections urged from a humanitarian point of view against the live cattle trade. We have here then a triumph both for humanity and the American cattle industry.

QUARANTINE OF IMPORTED ANIMALS.

While imported cattle had been for several years subject to quarantine, sheep and swine, which were equally liable to bring contagion, were admitted to the country without detention. This defect of the regulations was noticed by foreign countries and commented on as a reason for excluding our live stock. Our sheep and swine are both killed on the English docks where landed for no other admitted reason, than that our quarantines are not sufficiently stringent to guard against the introduction of contagion from abroad.

Under the act of August 30, 1890, power was secured by which imported sheep and swine are now held in quarantine for fifteen days and the danger of introducing contagious diseases is thereby avoided.

INSPECTION OF ANIMALS AND MEATS.

Perhaps the most important of all legislation enacted by the Fifty-first Congress in the interest of not only the live-stock industry but of the entire population of the United States, is the act of March 3, 1891, providing for the inspection of live-stock and their products. This law requires that all cattle, sheep, and swine killed for consumption, and destined for interstate and foreign commerce, shall be inspected to ascertain whether the animals are wholesome, sound, and fit for human food.

Under the regulations made by the Secretary to carry out the provisions of this act, two inspections are made of every animal, one prior to slaughter and the other after slaughter. In the case of swine there is, in addition to the above two inspections, a microscopical inspection to decide whether the carcass is free from trichinae. American pork was prohibited from entering European markets, it being alleged that it was infected with this microscopic parasite. An objection of this kind could only be met by an inspection that would guaranty this product to be free from the parasite. For years it was asserted that such an inspection could only be made at enormous expense and with great delay to the business of the packing houses. The inspection, however, was undertaken and has been made a success. It costs but about five cents per hog, or $\frac{1}{30}$ of a cent per pound, and it is conducted without the least delay to the packing houses. This inspection guarantees to the consumers both at home and abroad the wholesomeness of our meat products, and greatly increases their consumption. Prohibitions against our pork have been removed by Germany, Denmark, Austria, France, Italy, and Spain, and this product now goes to nearly every portion of the globe without discriminating restrictions. From September, 1891, to April, 1892, inclusive, more than 30,000,000 pounds of inspected pork has been exported, and such pork now brings about a cent a pound more in our own markets than that which has not been inspected.

The execution of the comprehensive plan outlined above for protecting our animals from disease, for guarantying the wholesomeness of our meats, and for enlarging and extending our export trade has been an unqualified success, and has sustained or improved the prices of all meat-producing animals raised in the United States.

DOMESTIC SUGAR.

For some years the Division of Chemistry of the Department had been engaged in experiments with a view to increasing the actual sugar product obtained from the cane in Louisiana and to the possibility of making the sorghum sugar industry a profitable one. The work undertaken by this Division in connection with our domestic sugar suggested to Secretary Rusk a wide extension of its duties so as to include not merely the application of new and improved processes to the cane sugar industry in the South and to the establishment of the sorghum sugar industry, but to the introduction also into this country of the beet sugar industry, so as ultimately to render the United States absolutely independent of the foreign sugar-growers, to whom the people of this country annually pay the enormous sum of 105 million dollars. Not only does this sum increase with the growth of the population, but the actual consumption of sugar per capita is increasing, so that in twenty years from now, with a population of 100 million, there is every probability that unless we have ere that time solved the problem of domestic sugar production, the United States will be paying to foreign sugar-growers a sum aggregating 175 million dollars, or at the rate of \$1.75 for every man, woman, and child in the country. To save this enormous annual outgo and divert it from the foreign to the American producer has been the fixed object aimed at under the present Administration. The results of the energetic and intelligent work done are most gratifying. To the development and application of the diffusion process the cane-growers of Louisiana owe a large increase in the sugar product per ton of cane, an increase which, were the improved process perfected by the Department generally adopted by the planters, would add millions yearly to the revenue of the State.

SORGHUM SUGAR.

The sorghum sugar industry, which the Secretary found on assuming office to be in a languishing condition, has been wonderfully revived. The geographic limits within which sorghum may be successfully grown for sugar have been clearly defined, and efforts outside that area discouraged, so as to avoid disappointment in the future. The brightest and most experienced workers were set to the task of discovering some method by which the chief difficulty in the manufacture of sugar from sorghum might be overcome. As a result the process now known as the alcohol process was perfected, and the experience of the past year in the sugar-making station at Medicine Lodge, Kansas, has clearly demonstrated the practicability of this process in its application to manufacture, with results fully commensurate to those obtained in the laboratory. The experiments in the test of varieties with a view to securing and propagating those which can be depended upon for the richest yield of saccharine matter have been carried on, with the result of obtaining four or five varieties which can be relied upon by those who desire to raise sorghum for sugar purposes. The experiments of the Department have been still further directed to the development and perfection of these particular varieties, with a view to still further increasing their sugar contents.

BEET SUGAR.

The effort to develop the beet sugar industry has been undertaken, actively pursued, and satisfactory results practically obtained under the present Administration. The best varieties of sugar beet seed were imported into the country and distributed to farmers and experiment stations in those States whose soil and climatic conditions promised probable success in sugar beet culture. Careful instructions, giving all needed information in regard to the preparation of the soil and the most approved methods of culture, were printed by the thousand and accompanied each package of seed distributed. To these instructions were added

needed words of caution as to the delusive hopes too often excited by enthusiastic advocates of new industries. Careful estimates were prepared as to the cost of thoroughly well-equipped beet sugar factories, and bulletins were issued containing full particulars in regard to the improved process of manufacture. At present the Department is running with great advantage three sugar stations; one for cane sugar in Florida, one for sorghum sugar in Kansas, and one for beet sugar in Nebraska. It must by no means be supposed that this sugar work comprises the entire business of the Division of Chemistry, which is charged with all important work of chemical analyses, and, under a special appropriation made for the purpose by Congress, with investigations into food adulterations, the results of which have already been published in a series of six bulletins; but as the sugar work is that which promises for the present the most important economic results, that work has been described here more fully.

STATISTICAL WORK.

In the minds of many persons the statistical work of the Department consists simply in the preparation of monthly reports, showing the condition of our crops, with occasional reference to the condition of crops abroad, and a record of the rates of transportation of land and ocean traffic. Such are indeed the main features of the regular monthly bulletins known as crop reports with which the people have become most familiar. That work is, however, only one feature of the statistical work, at least under this Administration. Secretary Rusk has given to the work general extension on broad lines, including a close and thorough review not only of the conditions of the crops and markets at home, but of the general supply and demand of and for all agricultural products throughout the world. According to his oft-repeated assertions in his annual reports to the President, it is absolutely essential for a country raising a surplus of several crops to have purchasers for such crops in foreign countries. Moreover, to accomplish a suitable diversification in our own agriculture and to supply with the products of our own soil a large proportion of the products now imported from abroad, which by careful experiment and intelligent culture he is satisfied we could produce at home, it is necessary that the farmers should be kept thoroughly well informed as to the demand of all foreign countries, their sources of supply, the prices paid for the several products in the various foreign markets, and the form and character in which these products meet the readiest sale, and at the same time keep our people informed as to the vast quantities of agricultural products which we ourselves now seek in foreign markets at an annual cost of not less than 250 million dollars paid to the foreign producer; of the character of the products which comprise these markets; in a word, of all information necessary to enable us to readily market the surplus of our various surplus crops abroad, and to substitute home-grown for foreign-grown agricultural products as far as possible in the home markets. Such is the broad scope and enlarged sphere of action which he has assigned to the Statistical Division of the Department.

Special attention has been devoted during the past year to the study of a field heretofore greatly neglected, especially as regards a market for our agricultural products—namely, the Southern, or, as they are generally called, Latin-American republics. Special reports have been prepared in the Statistical Division of the Department for the information of American exporters in regard to the agricultural resources of several of these republics, the character of their home products being a very good indication as to the character of the products which it is necessary for them to import. As a matter of fact, while the balance of trade between the United States and these countries is largely against the former, they do import a considerable quantity of products of which American farmers produce a surplus, but that trade is at present almost monopolized by Europeans. A bulletin con-

sisting of the several articles referred to as already published, and others which have not heretofore been printed, together with some interesting figures showing the exact condition of our trade with these countries, has been published. It is made very clear that the vast area of the United States, being mainly in the temperate zone, and the principal area of the Latin-American republics being in tropical or sub-tropical zones, the character of their products will be necessarily dissimilar, and a profitable interchange should, therefore, inure to the benefit of both the United States and South America.

INDIAN CORN FOR EUROPE.

Another of the markedly progressive features to be recorded to the credit of this year's work under Secretary Rusk is the introduction of Indian corn to the people of Europe as a nutritious and economical substitute for other cereal foods. Soon after his attention was called to the work which was being done voluntarily, and at his own expense, by an American citizen, Col. C. J. Murphy, on behalf of Indian corn in Europe, the Secretary determined that he had a right to have, and should receive, official recognition and the aid of the Department of Agriculture. He was accordingly commissioned as the corn agent of the Department in Europe, with instructions to report directly to the Secretary of Agriculture. The report of the work done in connection with this subject in Great Britain has already been issued, and from it can be gleaned the extent and value of the efforts already put forth on behalf of the American corn-raiser. From Great Britain the war has been carried into Germany. There it has been, to a certain extent, introduced under government auspices, the condition of the cereal crops in Europe having been such as to arouse a profound interest in administrative circles in any new cereal food product. No report has yet been published of the work done in this direction in Germany, but from letters and reports received from time to time by the Secretary from his special agent, Col. Murphy, we learn that the prospects for securing a good foothold in that country for our Indian corn and its many products is most encouraging, provided only, that those who are interested directly in this industry in the United States follow the advice given by Secretary Rusk himself in his prefatory note to the report already referred to, in which he states that he wishes to emphasize the necessity "for vigorously following up the efforts of this Department by the individual or combined efforts of parties interested in the trade in these products." Evidence of this is furnished by a comparison (from German sources) of the imports of American Indian corn into that country for the first three months of 1892, with those for the corresponding period of 1891. The imports in January, February, and March 1892, were 5,847,852 bushels, while in 1891, for the same months, they were only 1,111,424 bushels, an increase of 4,736,428 bushels in three months and yet the work of introducing corn as a human food into Germany was not undertaken by the Department's Representative until October, 1891. As the figures during the three months of 1892 referred to, show a steady and rapid increase, it is probable that when figures for the second quarter of the current year are available, the increase will be shown to be still greater. The importance of extending our foreign trade in this direction is shown by the fact that our exports for many years have averaged not quite 4 per cent of the whole crop, increasing only when, as the result of a specially large crop, the price has fallen very low. A steady demand for our surplus of this crop, which would secure an advance in price of even 5 cents a bushel on an average, would, during the ensuing decade, result in the addition of a thousand million dollars to the value of the corn crop in this country.

CO-OPERATION WITH STATE EXPERIMENT STATIONS.

With a full appreciation of the liberal support afforded by the National Government to the State agricultural experiment stations, aggregating over three quarters

of a million dollars per annum in addition to the liberal grant made by the Government to the several colleges with which the stations are connected, Secretary Rusk has taken advantage in every possible way of the clause in the law establishing a slender—perhaps too slender—connection between the Department and the stations, and authorizing him “to suggest lines of inquiry.” He has frequently invited co-operation with the stations of different States in carrying on experiments in regard to some particular crop for which this or that State seemed specially adapted, or for general experiments requiring a certain amount of field work for which, of course, the Department has no available land. Co-operation has been had, for instance, between the Department and some of the stations in regard to the culture of sugar; co-operative experiments have also been carried on in regard to grasses with a view to providing grasses well adapted to the Southern States, and others suitable for the semi-arid regions of the far West. As regards the latter, indeed, there is in one State, Kansas, a special experiment station established by the Department directly, from which very encouraging results have been obtained. Other co-operative experiments have included flax-growing and the combating of plant diseases, while the most recent, and in the light of future developments one of the most important, of these co-operative experiments projected is directed to checking the rapidly growing imports of Egyptian cotton into this country, by providing a home-grown substitute possessing all the characteristics which have caused the imports of Egyptian cotton to aggregate during the last fiscal year over 22 million pounds. Secretary Rusk proposes experiments on a large scale with foreign cotton seed supplied by the Department to stations in the several States where cotton is grown successfully. His proposition to these stations has been greeted with enthusiasm, and it is hoped that within a very few years we shall be able to produce on our own soil every description of cotton our manufacturers require.

FIGHTING INSECT PESTS.

To fully appreciate the importance of the work devolving upon the Department of Agriculture, an intimate knowledge of the magnitude of the various agricultural interests is necessary. The warfare being conducted by the Department on the diseases of plants, and upon the injurious insect pests which destroy so many of our crops, has never been so energetically prosecuted as now.

It is under this Administration that science has won some of its most distinguished victories on behalf of agriculture. Three years ago the orange-growers of California were prepared to abandon their hitherto lucrative industry, utterly discouraged by the ravages of the scale insect. This insect was known to exist in Australia, where it was discovered, however, that a parasite, the ladybug, kept it so well in check that its injurious effects in that country were comparatively slight. The successful introduction of this parasite into California accomplished the same result there, and to-day the California orange-grower no longer fears the efforts of his whilom enemy.

HELPING THE FRUIT-GROWER.

Grape-growers who have seen their crops injured to the extent of a loss of 30 to 40 per cent of the crop yearly, as the result of black rot and downy mildew, have turned to the Department for relief, and that not in vain. As the result of their investigations, fully 5,000 grape-growers adopted last year the treatment recommended by the Department. Ninety per cent of these succeeded in saving from 50 to 80 per cent of the crop.

For the past fifty years our nurserymen have been importing tree seedlings, because leaf blight prevented them from being grown here. The researches of the Department during the past two years have shown them that it can be prevented

at comparatively little expense, and this applies also to plums, apples, and cherries. The losses from pear and apple scab, which have been estimated at from \$6,000,000 to \$8,000,000 yearly, have also been successfully fought, and the value of the crop on a single tree, it has been found, can be increased from \$1 to \$3 at an expenditure of from 15 to 20 cents.

PUBLICATIONS.

The U. S. Department of Agriculture is an extensive publisher. In fact, under the act which created it, the publishing of the results of its investigations and inquiries is made as essential a part of its duty as the undertaking of the investigations and inquiries themselves. In addition to the publication of the Annual Report, which has for some years past averaged 400,000 copies, the appropriations for many of the special lines of work assigned to the Department include a clause authorizing the publication of the results. There is, moreover, included in the appropriations for public printing a certain sum set aside for the Department of Agriculture. One of the first inquiries of Secretary Rusk on assuming the office of Secretary of Agriculture was as to the manner of administering the printing fund and as to the character and distribution of the publications issued. The results of his inquiry showed that there was practically no system in this part of the work, and that the character of publications varied not only as to the subjects of which they treated but according to the individual notions of the several persons in charge of the various divisions of the work. The Annual Report of the Department, including not only the report of the Secretary to the President but the reports made to their Chief by the heads of the several branches of the work, showed equal variety in method and character. Some were popular in style, some purely scientific, and some partook a little of both. Secretary Rusk at once decided that an edition of such magnitude ought to be popular in its character, and the various persons contributing to it were so instructed. The great increase in the number of Divisions in the Department—only twelve when the Secretary assumed office and now numbering nineteen—made it necessary, moreover, to adopt some system in regard to the space to be allotted to each branch of the work. Steps were taken to keep each report within reasonable limits, with the result that the Reports for 1889, 1890, and 1891 fill respectively considerably less space than the Reports for 1887, and 1888, notwithstanding the great increase in the number of Divisions reporting. In fact, but for this systematizing and pruning of the Report, the Reports for 1889, 1890, and 1891 would have been formidable, bulky volumes, the cost of which would have exceeded the annual appropriation made therefor. After disposing of the Annual Report, the several bulletins issued from time to time during the year were made the subject of earnest consideration, the Secretary finally concluding that these must be divided into classes: those recording solely the scientific work done to be issued in small editions for the use of the officers of the Department and their successors and for students and agricultural scientists; while on the other hand, for the information and benefit of farmers generally, instructions were given that bulletins be prepared embodying the results of the Department work in their bearing upon practical agriculture, and that these must be set forth in plain, clear, simple language, and published in inexpensive form, these bulletins to be issued in as large editions as the appropriations available for the purpose permitted, in order to satisfy the needs of all practical farmers as far as possible. To aid in the judicious distribution of the bulletins in their several classes the assistance of the agricultural papers has been extensively and successfully enlisted. Notices of all popular bulletins, setting forth briefly their subject and character, are furnished to the agricultural press in advance of the publication, so that every intelligent farmer can keep posted as to the publications issued and apply in good season for such as he may require; while, as a further check, there is mailed to

every agricultural paper, monthly, a list of all the publications of the Department actually issued during the previous month. To quote Secretary Rusk's own words: "This plan virtually covers the entire field, for the farmer who does not read some paper devoted to his calling is practically beyond the reach of intelligent effort on his behalf." As to the result of these methods, it need only be said that not only have the publications of the Department doubled in number, reaching by the improved methods of distribution not only twice but four times as many people as heretofore, but they have been of such a character as to meet the requirements of the practical farmers, stock-raisers, horticulturists, and dairymen, upon whose efforts the success of agriculture depends. Farmers' bulletins, many of them specially designed to meet particular emergencies, such as that on spraying for insect pests and plant diseases, that on tobacco culture, on the culture of the sugar beet, etc., have been issued in editions of from 10,000 to 150,000 copies, the largest of which, owing to the condensation of matter and the inexpensive form, have cost less than many more pretentious Government publications issued in editions of but one thousand.

Among the most popular reports issued under the present Administration is that on the Diseases of the Horse, of which the Department has issued two editions of 20,000, which have, however, been found so utterly inadequate to supply the popular demand that the last Congress caused to be published a special edition of 100,000. This, so far from exciting criticism on the part of the present Congress, notwithstanding its changed political complexion, has been endorsed by it in the most practical manner possible, namely, by ordering another special edition of 45,000 copies, making a total issue of this admirable report, commended alike by all practical men whatever their political affiliation, of 185,000 copies. Reports of a similar character are now in press relating to cattle and sheep, and as the horse book contained a single article which, according to a Democratic Senator was worth a million dollars annually to the horsemen of the United States, so the report on cattle contains a plain, practical treatise upon the subject of feeding, which is likely to call out quite as enthusiastic commendation on behalf of the cattle men.

The statistical charts showing the distribution throughout the country of the several crops, of farm animals, of arable land, etc., etc., have elicited, like the reports just mentioned, commendation both at home and abroad, the publications of the Department being eagerly sought for by foreign governments and universally commended abroad as the finest efforts put forth by any government on behalf of practical agriculture.

DEVELOPMENT OF THE WEATHER BUREAU.

The law which created the Weather Bureau by dividing the Signal Service of the Army and established the same in and attached it to the Department of Agriculture, specifically provided that it should "be hereafter specially developed and extended in the interests of agriculture," after having provided in a more or less specific manner that its benefits should accrue to "agriculture, commerce, and navigation." How faithfully and efficiently the present Secretary of Agriculture has obeyed the law, in letter and spirit, will be seen by the following statement of the growth of the Bureau.

Since the transfer, a little over ten months ago, 19 stations which at that time were authorized to forecast only for "station and vicinity" have been placed in charge of local forecast officials and the territory enlarged in most instances so as to cover an entire State, and 6 new stations of the former kind have been established. The 51 stations that were issuing daily weather maps have been increased by 14 new ones already in operation, and 5 additional are now preparing for this most useful and popular class of work.

There has been an increase of 15 wind-signal stations on the Gulf, Lakes, and

sea coasts, of 19 stations for river observations, and of 6 special rainfall stations. There has been an increase of over 3,000 daily maps in the issues from the stations and of 1,600 of the large weekly map and crop bulletin issued from the Washington office. The publication of weather maps has been secured in 11 daily newspapers having a combined circulation of 337,000 copies, thus presenting a graphic illustration of weather conditions to an immense number of persons in the most convenient and easily available form yet devised for the dissemination of information concerning the weather. Weekly rain and temperature maps, as well as the Crop Bulletins, are also printed in 4 agricultural journals whose combined circulation is considerably over 300,000 copies, and the Weekly Crop Bulletin, without maps, is printed in 3 other agricultural papers with an aggregate circulation of about 50,000 copies.

There have been 12 new State Weather Services established, which complete the entire number of States and Territories excepting only Idaho. Through this special means the Bureau seeks connection and close co-operation with the local authorities for the better and wider distribution of its various forecasts and warnings, and its bulletins and maps, as well as to secure the most complete and systematic series of crop reports during the growing season.

Through these agencies there have been secured 1,288 new display stations of various kinds and an increase of 205 voluntary observers; the issue of daily bulletins has been enlarged 1,567; and while 20 new lines of railroads have been added to the former number that telegraphed our forecasts to all their stations free of expense to the Bureau, an entirely new departure has been made in the direction of free train distribution of bulletins and 40 lines of railroad are now daily distributing these local reports to their various stations where their own agents post them for the benefit of the public.

The Bureau has been brought into immediate touch with the farmers of the country through their organizations, and while many of them have already been supplied with flags and daily forecasts, not less than 400 such organizations now await the ability of the Bureau to supply them in like manner. These efforts have resulted in immensely increasing the volunteer help given the Bureau, and nothing could more emphatically prove the esteem in which the public hold the new work than such willingness to help it along without pecuniary compensation.

While these various successes have been achieved in accordance with the intent of the law making the transfer of the Bureau, there has been no relaxation of the work along scientific lines. Steps have already been taken to re-establish the system of high-altitude observations which was abandoned under the old regime. One or more mountain stations will be put into operation the present season and the feasibility of some sort of balloon observation is now under investigation.

In the matter of special meteorological studies along practical lines substantial progress has been made or is now making. Such questions as these,—the use of smoke in preventing frost injury, the development of the use of wind power, the feasibility of thunder-storm predictions, the climatology of special crops, the climatology of special States, the climatology of Chicago for purposes of the World's Fair, the currents and fogs of the Great Lakes—have been already taken up by specially selected experts and the fruits of their labors will be forthcoming in due time.

APPRECIATION OF THE DEPARTMENT BY FARMERS.

The general appreciation of the work the Department has done under the present Administration is widespread, but among no class of people has it been more strongly and widely endorsed than among the farmers of the country. From the first the work of the Department, not only under the new Administration but under a new dispensation as one of the full Executive Departments of the Govern-

ment, has been closely and even critically watched by the representatives of the National Grange, one of the most extensive agricultural organizations in the country, characterized by great conservatism, and which for years had persistently sought the elevation of the Department to the rank which it now holds. As the result of this critical consideration, witness the resolutions adopted at the last meeting of the National Grange expressing cordial sympathy with the efforts undertaken by Secretary Rusk to extend the work of the Department and to administer it in all things for the benefit of its especial constituents—the farmers; also, expressing special approval of the efforts of the Secretary to extend foreign markets for American agricultural products; and instructing the executive committee to confer with the Secretary with a view to a further enlargement of this important work. Witness also the resolutions adopted at the Farmers' Congress, at which thirty States and Territories were represented by delegates embracing all political parties, which have as generously, earnestly, and as warmly commended the work of the Department and Secretary Rusk as did the National Grange. Witness moreover, the innumerable resolutions of a similar character from State agricultural organizations and other farmers' gatherings of all descriptions—far too numerous to be quoted in detail.

